SHS AISI410

60° COUNTERSUNK SCREW

UKCA UKTA-0836 22/6195

CE ETA-11/0030

SMALL HEAD AND 3 THORNS TIP

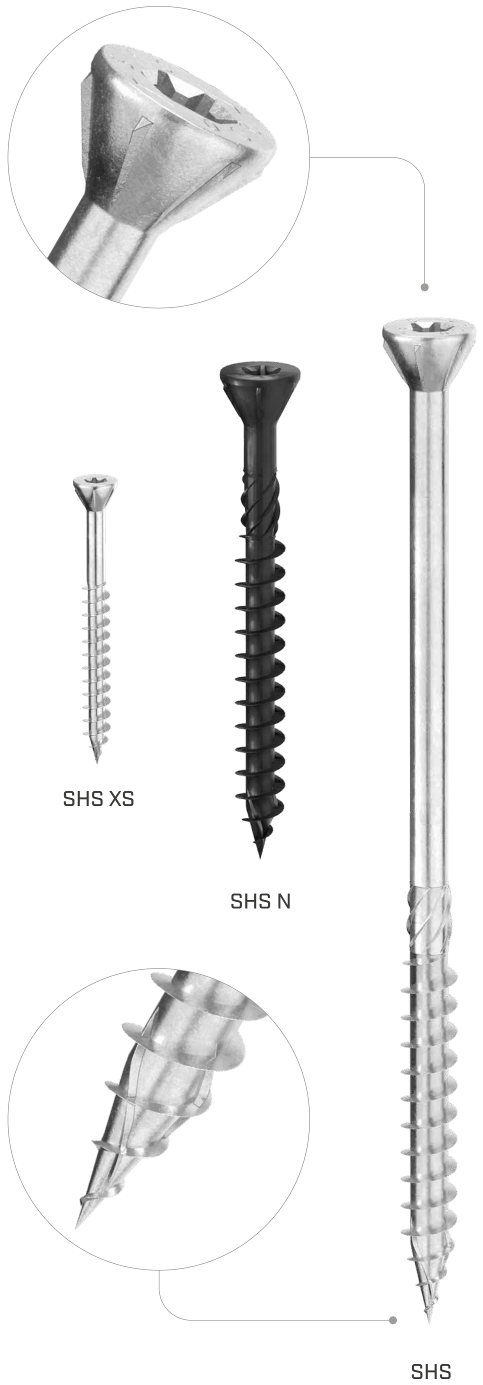
The concealed 60° head and 3 THORNS tip allow easy insertion of the screw into small thickness without creating openings in the timber.

OUTDOOR ON ACID WOOD

Martensitic stainless steel. This stainless steels offers the highest mechanical performance compared to the other available stainless steels. Suitable for outdoor applications and on acid wood, but away from corrosive agents (chlorides, sulphides, etc.).

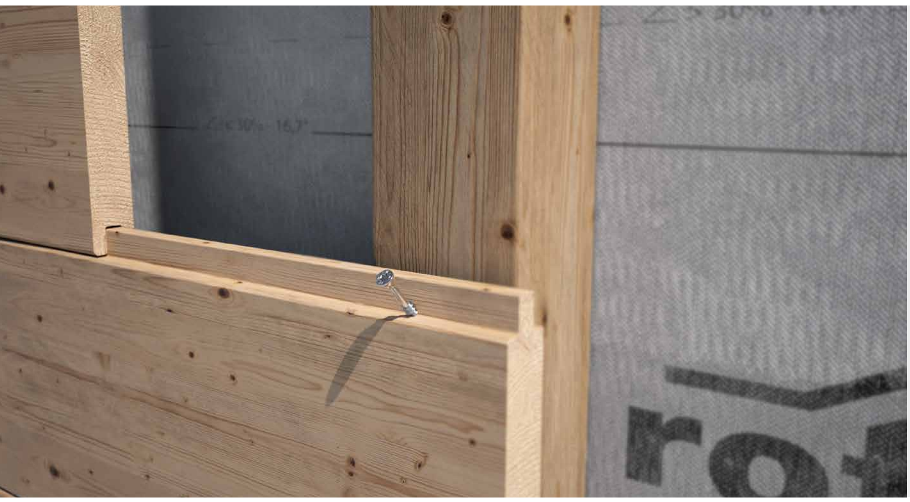
SMALL ELEMENTS FASTENING

The smaller diameter versions are ideal for fixing beads or small elements, the 3.5 mm diameter version is perfectly suited for fastening tongue-and-groove boards.



BIT INCLUDED

DIAMETER [mm]	3 — 3,5 to 8 — 12
LENGTH [mm]	12 — 40 to 280 — 1000
SERVICE CLASS	SC1, SC2, SC3
ATMOSPHERIC CORROSIVITY	C1, C2
WOOD CORROSIVITY	T1, T2, T3, T4
MATERIAL	410 AISI — martensitic stainless steel AISI 410



FIELDS OF USE

- timber based panels
- solid timber
- glulam (Glued Laminated Timber)
- CLT, LVL
- high-density woods and acid woods

WINDOWS AND DOORS ON THE OUTSIDE

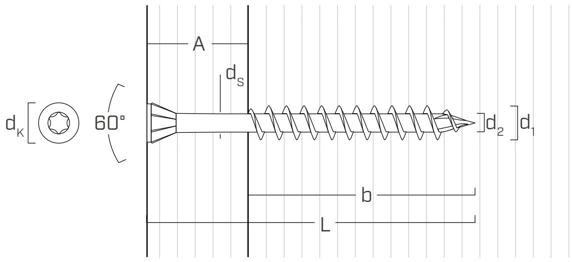
SHS AISI140 is the right choice for fastening small outdoor elements such as beads, façades and window/door frames.

External casing slats fixed with 6 and 8 mm diameter SHS AISI410 screws.

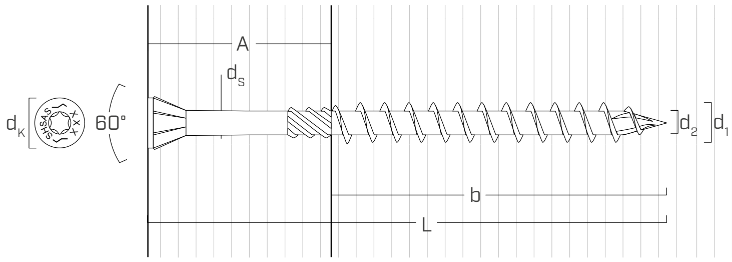
Fastening hardwood and acid wood in far-from-sea environments with SHS AISI410 8 mm diameter.

GEOMETRY AND MECHANICAL CHARACTERISTICS

SHSAS Ø3,5



SHSAS Ø4,5 - Ø5 - Ø6 - Ø8



GEOMETRY

Nominal diameter	d_1	[mm]	**3,5**	**4,5**	**5**	**6**	**8**
Head diameter	d_K	[mm]	5,75	7,50	8,50	11,00	13,00
Thread diameter	d_2	[mm]	2,15	2,80	3,40	3,95	5,40
Shank diameter	d_S	[mm]	2,50	3,15	3,65	4,30	5,80
Pre-drilling hole diameter(1)	$d_{V,S}$	[mm]	2,0	2,5	3,0	4,0	5,0
Pre-drilling hole diameter(2)	$d_{V,H}$	[mm]	-	-	3,5	4,0	6,0

(1) Pre-drilling valid for softwood.
(2) Pre-drilling valid for hardwood and beech LVL.

CHARACTERISTIC MECHANICAL PARAMETERS

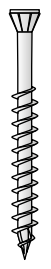
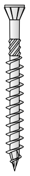
Nominal diameter	d_1	[mm]	**4,5**	**5**	**6**	**8**
Tensile strength	$f_{tens,k}$	[kN]	6,4	7,9	11,3	20,1
Yield moment	$M_{y,k}$	[Nm]	4,1	5,4	9,5	20,1

			softwood *(softwood)*	**LVL softwood** *(LVL softwood)*	**pre-drilled beech LVL** *(beech LVL predrilled)*
Withdrawal resistance parameter	$f_{ax,k}$	[N/mm²]	11,7	15,0	29,0
Head-pull-through parameter	$f_{head,k}$	[N/mm²]	10,5	20,0	-
Associated density	ρ_a	[kg/m³]	350	500	730
Calculation density	ρ_k	*[kg/m³]*	*≤ 440*	*410 ÷ 550*	*590 ÷ 750*

For applications with different materials please see ETA-11/0030.

CODES AND DIMENSIONS

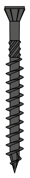
SHS XS AISI410

d_1 [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
3,5 TX 10	**SHS3540AS(*)**	40	26	14	500
	SHS3550AS(*)	50	34	16	500
	SHS3560AS(*)	60	40	20	500
4,5 TX 20	**SHS4550AS**	50	30	20	500
	SHS4560AS	60	35	25	500
	SHS4570AS	70	40	30	200
5 TX 25	**SHS550AS**	50	24	26	200
	SHS560AS	60	30	30	200
	SHS570AS	70	35	35	100
	SHS580AS	80	40	40	100
	SHS5100AS	100	50	50	100

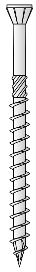
(*) Not holding CE marking.

SHS N AISI410 - black version



d_1 [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
4,5 TX 20	**SHS4550ASN**	50	30	20	100
	SHS4560ASN	60	35	25	100
5 TX 25	**SHS550ASN**	50	24	26	100
	SHS560ASN	60	30	30	200

SHS AISI410



d_1 [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
6 TX 30	**SHS680AS**	80	40	40	100
	SHS6100AS	100	50	50	100
	SHS6120AS	120	60	60	100
	SHS6140AS	140	75	65	100
	SHS6160AS	160	75	85	100
	SHS6180AS	180	75	105	100
	SHS6200AS	200	75	125	100
8 TX 40	**SHS8120AS**	120	60	60	100
	SHS8140AS	140	60	80	100
	SHS8160AS	160	80	80	100
	SHS8180AS	180	80	100	100
	SHS8200AS	200	80	120	100
	SHS8220AS	220	80	140	100
	SHS8240AS	240	80	160	100
	SHS8260AS	260	80	180	100
	SHS8280AS	280	80	200	100

APPLICATION

Oak
Quercus petraea
ρ_k = 665-760 kg/m³
pH ~ 3,9

Oak or European oak
Quercus robur
ρ_k = 690-960 kg/m³
pH = 3,4-4,2

Douglas fir
Pseudotsuga menziesii
ρ_k = 510-750 kg/m³
pH = 3,3-5,8

American black cherry
Prunus serotina
ρ_k = 490-630 kg/m³
pH ~ 3,9

European chestnut
Castanea sativa
ρ_k = 580-600 kg/m³
pH = 3,4-3,7

Red oak
Quercus rubra
ρ_k = 550-980 kg/m³
pH = 3,8-4,2

Blue Douglas fir
Pseudotsuga taxifolia
ρ_k = 510-750 kg/m³
pH = 3,1-4,4

Maritime pine
Pinus pinaster
ρ_k = 500-620 kg/m³
pH ~ 3,8

Possible installation on acid wood but away from corrosive agents (chlorides, sulphides, etc.).

Find out the pH and density of the various wood species on page 314.

pH ≤ 4
"aggressive" woods
high acidity

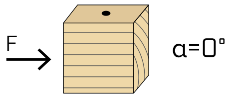
pH > 4
"standard" timbers
low acidity

FAÇADES IN DARK TIMBER

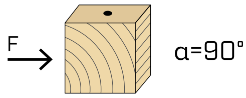
Specially designed to match façades made of charred wood, the black SHS N variant ensures perfect compatibility and offers an excellent aesthetic result. Thanks to its strength to corrosion, it can be used outdoors, allowing to create striking and long-lasting black façades.

MINIMUM DISTANCES FOR SHEAR LOADS

screws inserted **WITHOUT pre-drilled hole** — $\rho_k \leq 420\ kg/m^3$

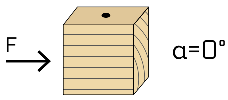


d_1	[mm]		4,5		5	6	8
a_1	[mm]	10·d	45	10·d	50	60	80
a_2	[mm]	5·d	23	5·d	25	30	40
$a_{3,t}$	[mm]	15·d	68	15·d	75	90	120
$a_{3,c}$	[mm]	10·d	45	10·d	50	60	80
$a_{4,t}$	[mm]	5·d	23	5·d	25	30	40
$a_{4,c}$	[mm]	5·d	23	5·d	25	30	40

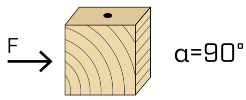


d_1	[mm]		4,5		5	6	8
a_1	[mm]	5·d	23	5·d	25	30	40
a_2	[mm]	5·d	23	5·d	25	30	40
$a_{3,t}$	[mm]	10·d	45	10·d	50	60	80
$a_{3,c}$	[mm]	10·d	45	10·d	50	60	80
$a_{4,t}$	[mm]	7·d	32	10·d	50	60	80
$a_{4,c}$	[mm]	5·d	23	5·d	25	30	40

screws inserted **WITHOUT pre-drilled hole** — $420\ kg/m^3 \leq \rho_k \leq 500\ kg/m^3$

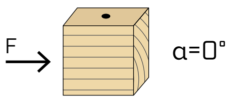


d_1	[mm]		4,5		5	6	8
a_1	[mm]	15·d	68	15·d	75	90	120
a_2	[mm]	7·d	32	7·d	35	42	56
$a_{3,t}$	[mm]	20·d	90	20·d	100	120	160
$a_{3,c}$	[mm]	15·d	68	15·d	75	90	120
$a_{4,t}$	[mm]	7·d	32	7·d	35	42	56
$a_{4,c}$	[mm]	7·d	32	7·d	35	42	56

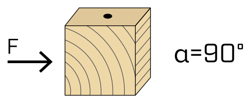


d_1	[mm]		4,5		5	6	8
a_1	[mm]	7·d	32	7·d	35	42	56
a_2	[mm]	7·d	32	7·d	35	42	56
$a_{3,t}$	[mm]	15·d	68	15·d	75	90	120
$a_{3,c}$	[mm]	15·d	68	15·d	75	90	120
$a_{4,t}$	[mm]	9·d	41	12·d	60	72	96
$a_{4,c}$	[mm]	7·d	32	7·d	35	42	56

screws inserted **WITH pre-drilled hole**

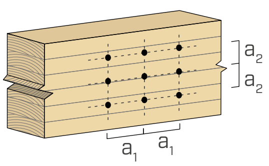


d_1	[mm]		4,5		5	6	8
a_1	[mm]	5·d	23	5·d	25	30	40
a_2	[mm]	3·d	14	3·d	15	18	24
$a_{3,t}$	[mm]	12·d	54	12·d	60	72	96
$a_{3,c}$	[mm]	7·d	32	7·d	35	42	56
$a_{4,t}$	[mm]	3·d	14	3·d	15	18	24
$a_{4,c}$	[mm]	3·d	14	3·d	15	18	24

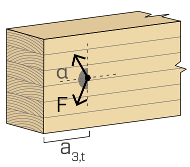


d_1	[mm]		4,5		5	6	8
a_1	[mm]	4·d	18	4·d	20	24	32
a_2	[mm]	4·d	18	4·d	20	24	32
$a_{3,t}$	[mm]	7·d	32	7·d	35	42	56
$a_{3,c}$	[mm]	7·d	32	7·d	35	42	56
$a_{4,t}$	[mm]	5·d	23	7·d	35	42	56
$a_{4,c}$	[mm]	3·d	14	3·d	15	18	24

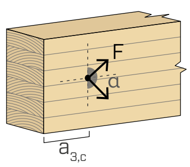
α = load-to-grain angle
d = d_1 = nominal screw diameter



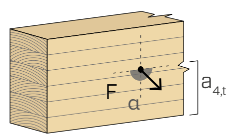
stressed end
-90° < α < 90°



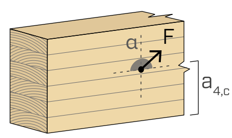
unloaded end
90° < α < 270°



stressed edge
0° < α < 180°



unload edge
180° < α < 360°

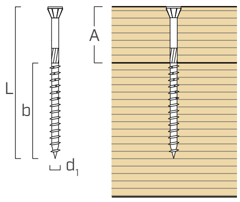
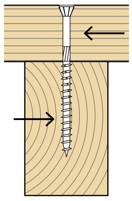
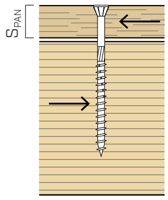
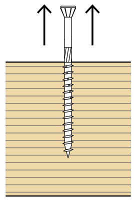
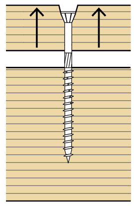


NOTES

- The minimum distances comply with the EN 1995:2014 standard in accordance with ETA-11/0030.
- The minimum spacing for all panel-to-timber connections (a_1, a_2) can be multiplied by a coefficient of 0,85.
- In the case of joints with elements in Douglas fir (Pseudotsuga menziesii), the minimum spacing and distances parallel to the grain must be multiplied by a coefficient of 1.5.
- The spacing a_1 in the table for screws with 3 THORNS tip and $d_1 \geq 5$ mm inserted without pre-drilling hole in timber elements with density $\rho_k \leq 420\ kg/m^3$ and load-to-grain angle α=0° was assumed to be 10·d based on experimental tests; alternatively, adopt 12·d in accordance with EN 1995:2014.

STRUCTURAL VALUES

CHARACTERISTIC VALUES
EN 1995:2014

				SHEAR			TENSION	
geometry				**timber-to-timber**	**panel-to-timber**		**thread withdrawal**	**head pull-through**
								
d_1 [mm]	L [mm]	b [mm]	A [mm]	$R_{V,90,k}$ [kN]	S_{PAN} [mm]	$R_{V,k}$ [kN]	$R_{ax,90,k}$ [kN]	$R_{head,k}$ [kN]
	50	30	20	0,99		1,01	1,70	0,64
4,5	60	35	25	1,11	15	1,01	1,99	0,64
	70	40	30	1,15		1,01	2,27	0,64
	50	24	26	1,21		1,14	1,52	0,82
	60	30	30	1,38		1,14	1,89	0,82
5	70	35	35	1,38	15	1,14	2,21	0,82
	80	40	40	1,38		1,14	2,53	0,82
	100	50	50	1,38		1,14	3,16	0,82
	80	40	40	2,01		1,60	3,03	1,37
	100	50	50	2,01		1,60	3,79	1,37
	120	60	60	2,01		1,60	4,55	1,37
6	140	75	65	2,01	18	1,60	5,68	1,37
	160	75	85	2,01		1,60	5,68	1,37
	180	75	105	2,01		1,60	5,68	1,37
	200	75	125	2,01		1,60	5,68	1,37
	120	60	60	3,16		2,48	6,06	1,92
	140	60	80	3,16		2,48	6,06	1,92
	160	80	80	3,16		2,48	8,08	1,92
	180	80	100	3,16		2,48	8,08	1,92
8	200	80	120	3,16	22	2,48	8,08	1,92
	220	80	140	3,16		2,48	8,08	1,92
	240	80	160	3,16		2,48	8,08	1,92
	260	80	180	3,16		2,48	8,08	1,92
	280	80	200	3,16		2,48	8,08	1,92

GENERAL PRINCIPLES

- Characteristic values comply with the EN 1995:2014 standard in accordance with ETA-11/0030.
- Design values can be obtained from characteristic values as follows:

$$R_d = \frac{R_k \cdot k_{mod}}{\gamma_M}$$

  The coefficients γ_M and k_{mod} should be taken according to the current regulations used for the calculation.
- For the mechanical resistance values and the geometry of the screws, reference was made to ETA-11/0030.
- Sizing and verification of the timber elements and panels must be done separately.
- The characteristic shear resistances are calculated for screws inserted without pre-drilling hole. In the case of screws inserted with pre-drilling hole, greater resistance values can be obtained.
- The screws must be positioned in accordance with the minimum distances.
- The characteristic shear resistances are calculated for screws inserted without pre-drilling hole. In the case of screws inserted with pre-drilling hole, greater resistance values can be obtained.
- The characteristic shear strengths were evaluated by considering the threaded part fully inserted in the second element.
- The characteristic panel-timber shear strengths are calculated considering an OSB3 or OSB4 panel, as per EN 300, or a particle board panel, as per EN 312, with thickness S_{PAN} and density ρ_k = 500 kg/m^3.
- The thread withdrawal characteristic strength has been evaluated considering a fixing length equal to b.
- The head pull-through characteristic strength was calculated using timber elements.

NOTES

- The characteristic shear and tensile strengths were evaluated considering both an ε angle of 90° ($R_{ax,90,k}$) between the grains of the timber element and the connector.
- For the calculation process a timber characteristic density ρ_k = 385 kg/m^3 has been considered.
  For different values of ρ_k, the strength values in the table can be converted by the $k_{dens,V}$ coefficient (see page 19).
- For a row of n screws arranged parallel to the direction of the grain at a distance a_1, the characteristic effective shear bearing capacity $R_{ef,V,k}$ can be calculated by means of the effective number n_{ef} (see page 18).